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A SPECIMEN  
OF  
FOUR HEALED, ASCENDING, ILEAL INVAGINATIONS,  
SYMMETRICAL AND EQUIDISTANT.

Presented to the Pathologic Section of the Chicago Academy of  
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## A SPECIMEN OF FOUR HEALED, ASCENDING, ILEAL INVAGINATIONS, SYMMETRICAL AND EQUIDISTANT.

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IN this paper it is intended to describe briefly and succinctly an intestine showing four symmetrical and equidistant, healed or irreducible, ascending ileac invaginations.

In order to emphasize the uniqueness of this specimen it will be necessary concisely to review the literature in regard to multiple, to ascending, and to healed intussusceptions.

I. *Multiple Intussusception*.—While the invaginations of the death agony are very frequently multiple, the “inflammatory invagination” appears to be almost invariably single.

The following instances are found in the literature of recent years.

Claudot<sup>1</sup> describes a descending ileac invagination, eighty centimetres below the pylorus, and a second one two metres below, the ileum passing into the colon.

Sibbly<sup>2</sup> showed a specimen from a female baboon of ileo-colic intussusception with two smaller invaginations higher up in the ileum, but the description is not enough to show positively the inflammatory or the agonal nature of the two smaller.

D'Arcy Power<sup>3</sup> detailed an instance of descending invagination of ileum into the colon, and three inches below the apex of this was a second ascending intussusception, one inch long. There were no tumors in the intestine, and there was a well-marked fibrinous exudate upon the serous surfaces, showing definitely the development of the invaginations some considerable time before death. The specimen came from a boy five months old, who had been sick for five days with the usual symptoms. Power remarks that he had recently heard of two operations for intussusception, each terminating fatally on account of the presence of a second unravelled invagination, but he gives no further details.

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<sup>1</sup> De l'Occlusion intestinale, Thèse, Paris, 1884.

<sup>2</sup> Transactions London Path. Society, vol. xxxix., 1888.

<sup>3</sup> Ibid., vol. xxxvii., 1886.



Eichhorst<sup>1</sup> mentions that Thomas, Birch-Hirschfeld, and Power, whose case has just been given, have all described multiple invaginations.

The cases of Peregrine and of Handfield Jones and Page, usually referred to as multiple intussusceptions, are properly considered as peculiar combinations of descending and ascending, doubled and five-layered invaginations, rather than as multiple in the sense of more than one separate, three-layered reduplication. Peregrine's<sup>2</sup> case was a descending invagination in the colon, in the centre of which was a small, retrograde, five-layered invagination. Jones and Page's<sup>3</sup> case was a descending ileo-cæcal and an ascending colico-colic intussusception with overlapping at the centre of the mass.<sup>4</sup>

Birch-Hirschfeld<sup>5</sup> describes minutely the post-mortem appearances in the intestine of a child, two years old, who had recovered from a double invagination, death occurring four months afterwards from measles. The lower portion of the ileum, the cæcum, and the vermiform appendix were absent, a circular external depression and a circular internal cicatrix showing where separation of the intussusceptum had occurred. At the junction of the ascending with the transverse colon was a similar cicatrix, from the appearance of which it was concluded that at this point there had been a second invagination. This case of Birch-Hirschfeld is the only recorded instance of healed multiple invagination that has come under my observation.

In the recent French book on medicine the statement occurs that there have been observed double and triple invaginations.<sup>6</sup>

The multiple invaginations described by Beecher<sup>7</sup> and by Longstreth<sup>8</sup> are from all appearances specimens of the agonal variety, because it is expressly stated that all signs of inflammation and strangulation were absent.

Allen<sup>9</sup> and Burge<sup>10</sup> have both described multiple intussusceptions, but their articles have been inaccessible.

II. *Ascending or Retrograde Intussusception.*—Brinton is quoted by Jones and Page<sup>11</sup> as saying that he would as soon believe in the existence of an ascending intussusception as in the existence of the sea serpent or any other fabled monster.

"Inflammatory invagination takes place without exception from above downward, so that a portion of the intestine is invaginated into another por-

<sup>1</sup> Handbuch der Speciellen Path. u. Therapie, 1891.

<sup>2</sup> Lancet, vol. i., 1873, p. 709.

<sup>3</sup> Medico-Chirurgical Transactions, vol. lxi. p. 301.

<sup>4</sup> For further details in regard to such manifold invaginations see Leichtenstern, Prag. Vierteljahresschrift, Bd. 118, 119, 120, and 121.

<sup>5</sup> Archiv der Heilkunde, Heft 1, 1869. Quoted in Intestinal Surgery by N. Senn, Chicago, 1889, p. 85.

<sup>6</sup> Traité de Médecine, Charcot, Bouchard, Brissand, tome iii., 1892, p. 519.

<sup>7</sup> Philadelphia Path. Soc. Trans., vol. v. p. 25, 1876.

<sup>8</sup> Ibid., vol. v. p. 26, 1876.

<sup>9</sup> Austr. Med. Journal, 1883.

<sup>10</sup> Proceedings Med. Soc. County Kings, 1879-80.

<sup>11</sup> Loc. cit.



tion lying below it" (Leichtenstern<sup>1</sup>). In a collation of five hundred and ninety-nine cases he was able to point out only eight instances of ascending or retrogressive invagination, and these, he says, deserve the name only anatomically.

Duchaussoy,<sup>2</sup> out of one hundred and thirty-seven cases of intussusception collected by him, found sixteen instances of retrograde invagination, all of which were complicated, and Haven<sup>3</sup> found three cases in fifty-nine.

Recently Korter<sup>4</sup> reported a case of retrograde invagination in the descending colon of a boy, eight years old, with active symptoms extending over a period of four days; in this case there were no complications of any kind, the ascending invagination mentioned being the only one present, and recovery took place promptly after the cœliotomy.

Dr. F. B. Wood<sup>5</sup> describes a specimen removed post-mortem from a woman, aged twenty-five, who died after suffering twelve days with quite typical symptoms of intestinal obstruction, which showed an ascending invagination six and three-fourths inches long, "the ileum being forced from below up, taking with it the ileo-cæcal valve and the cæcum."

It will be recollected that the inferior of the double intussusception described by Power<sup>6</sup> was ascending.

Eichhorst<sup>7</sup> states that Besnier, as well as Jones, described instances of invagination of the descending upward into the transverse colon in five-year-old boys.

In regard to the production of ascending invagination Leichtenstern<sup>8</sup> speaks authoritatively as follows: "Ascending invaginations deserve the name only anatomically; they are essentially different genetically from the primary inflammatory intussusceptions which are always and only descending. These ascending inflammatory invaginations occur at a time when the normal movement of the contents, the normal peristaltic action, is arrested by a serious affection of the intestine, usually peritonitis, with paralysis of long portions of it. They are therefore allied to the invaginations of the death-struggle, and are only distinguished from them by the fact that they appear more promptly and at a time when inflammatory union of the invaginated parts is still possible. On the other hand, in double invaginations a secondary ascending invagination sometimes occurs together with the primary descending one. This is usually produced by the flaccid, plaited, receiving layer of the primary invagination slipping upward between itself and the intussusception."

From this citation it would seem that Power's<sup>9</sup> case of descending ileo-cæcal and ascending colic invagination might be construed as an instance of

<sup>1</sup> Ziemssen's Cyclopædia, vol. vii. p. 611, 1876.

<sup>2</sup> Quoted by D'Arcy Power, loc. cit.

<sup>4</sup> Berliner Kl. Wochenschrift, No. 26, 1892.

<sup>5</sup> Peninsular Jour. Med., 1876, i. 157-159.

<sup>6</sup> Loc. cit.

<sup>7</sup> Loc. cit.

<sup>8</sup> Ziemssen's Cyclopædia, loc. cit.

<sup>9</sup> Loc. cit.

<sup>3</sup> Ibid.



a secondary ascending intussusception occurring together with a primary descending one, produced in the way Leichtenstern describes.

Such instances as Korter's<sup>1</sup> and Wood's cases of single, primary, ascending invagination in the descending colon are difficult to explain in view of the positive dictum that "primary inflammatory invaginations are always and only descending." As far as can be made out, there was no serious intestinal affection present that might be accompanied with peristalsis in a reverse, ascending direction. Irregular, limited, or vigorous peristalsis is regarded as the essential cause of intussusception, and it is not at all clear why such irregular peristalsis during life should always and only give rise to descending, vital invaginations, while the irregular peristalsis of the death-struggle results in the formation of ascending and descending invaginations with almost equal frequency.

III. *Healed Intussusception*.—Spontaneous termination of intussusception through the necrosis and elimination of the intussusception takes place, according to Treves,<sup>2</sup> in about forty per cent. of all the cases.

Gaultier de Claubry<sup>3</sup> collected twenty cases of invagination which terminated by the elimination of the strangulated portion of the bowel. Almost simultaneously Thomsen<sup>4</sup> gathered thirty-five cases, in which are included, according to Peacock,<sup>5</sup> all but two of de Claubry's cases. Then M. Duchaussoy<sup>6</sup> brought together thirty independent cases. More lately Leichtenstern<sup>7</sup> collected one hundred and forty-nine instances of spontaneous elimination, and from this material interesting data have been sought out concerning the more striking and important features of this aspect of intestinal invagination: thus, the sex, the age, the symptoms, the causes, the period at which the discharge of the sequestrum occurred, the portion of the intestine involved, the size of the piece or pieces evacuated, and the immediate as well as the remote results in these cases have all been studied and elaborated.

From the frequency of intussusception in early life and the few cases of elimination of the strangulated part in children, it has been inferred that during the earlier years the disease is too rapidly fatal to allow spontaneous termination to occur. Chiari,<sup>8</sup> however, describes an instance of intestinal atresia following an intra-uterine, ileal intussusception; H. Cripps<sup>9</sup> describes spontaneous elimination in a child of seven months, in which post-mortem examination—death being due to scarlatina—showed the small intestine adherent to the anus, the colon and the cæcum being absent. Similar cases are scattered through the literature.

<sup>1</sup> Loc. cit.

<sup>2</sup> Intestinal Obstruction.

<sup>3</sup> Journal Hebdomadaire Universel de Méd. et Chir., 1835.

<sup>4</sup> Medical and Surgical Journal, 1835.

<sup>5</sup> Transactions London Pathological Society, vol. xv. 113.

<sup>6</sup> Mém. de l'Académie Imp. de Méd., 1860.

<sup>7</sup> Loc. cit.

<sup>8</sup> Prag. Med. Wochenschrift, 1888.

<sup>9</sup> Quoted by Keen in "Keating's Encyclopædia."



Separation of the necrotic intussusception has been found to occur before the thirtieth day in the majority of the instances, "usually from the eleventh to the twenty-first day in acute cases."<sup>1</sup>

Most commonly the parts separated seem to have belonged to the ileum, but this is regarded as connected with the more common occurrence of intussusception in the small than in the large intestine.

In those instances that recover after the discharge of the strangulated necrotic intussusception, prophylactic adhesions at the neck of the intussusception provide for sequestration being confined within the intestine, and it is through this process that the patients escape alive. Elimination of the invaginated portion is not, of course, invariably followed by recovery. Leichtenstern's cases showed a mortality of forty-one per cent., and the subsequent history often shows that a not inconsiderable number of those that recover subsequently perish from perforation, peritonitis, or from the effects of intestinal stricture and ulceration.

When death occurs some time after the discharge of the intussusception the condition in the intestine may vary considerably: usually there is a more or less marked external, annular groove, and an internal annular ulcer, with more or less intestinal atresia and hypertrophy due to cicatricial thickening and contraction. Occasionally the calibre has been found to have escaped reduction, the coats of the intestine having united practically end to end. Thus Birch-Hirschfeld's<sup>2</sup> case of healed intussusceptions showed a quite ideal restoration of the continuity of the intestine. Then, again, the bowel may be made continuous by the interposition of a cavity between the two ends of the intestine.<sup>3</sup>

#### DESCRIPTION OF THE SPECIMEN.

*Clinical History.*—(Extract from the record in Cook County Hospital.) The patient was an Italian laborer, fifty-six years old, admitted in March, 1893. He could speak no English, and hence only an imperfect history was obtained; his friends could not supplement the information obtained during his life. Twenty years ago, when he was thirty-six years old, a double inguinal hernia made its appearance. Two years ago he was operated on, a permanent cure of the hernia on the left side following, but on the right side the hernia reappeared after eighty days. This was operated on again one year ago, but the hernia returned in forty days. The patient was small in stature, but well nourished, and in apparently good general health. The physical examination was also negative. In both inguinal regions were long cicatrices; no ring could be made out on the left side. On the right side the cicatrix runs over the summit of a tumor, the base of which was about eight centimetres square, the height about six centimetres. This tumor does

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<sup>1</sup> McAdam Eccles, St. Bartholomew's Hospital Reports, 1892.

<sup>2</sup> Thomsen, loc. cit.; Peacock, loc. cit.; Birch-Hirschfeld, loc. cit.

<sup>3</sup> Hill, Monthly Journal of Medical Science, 1845.



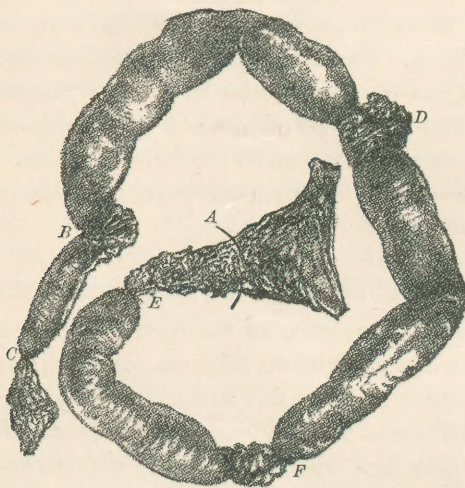
not collapse on placing the patient in the recumbent position, but compression pushes the contents up into the abdominal cavity; as they pass into the cavity gurgling is heard. There is well-marked impulse on coughing.

On March 14, 1893, he was operated on again by Dr. E. E. Babcock. The hernial sac was isolated with much difficulty, and, as there was no distinct ring made out, there being simply a large opening into the peritoneal cavity, the sac was deligated and the ring margins were approximated with silk sutures.

Symptoms of diffuse peritonitis set in almost immediately. Death in thirty-three hours.

*Anatomical Diagnosis.*—Diffuse sero-fibrinous peritonitis; recent operation in left inguinal region, with puckering ligature closing a large opening in the peritoneum; adhesive pericarditis; chronic mitral endocarditis; cardiac hypertrophy; aortic arterio-sclerosis; pigment calculi in gall-bladder; four equidistant, symmetrical, ascending, healed, ileal invaginations.

*Description of Invaginations.*—Fifty-four centimetres below the pyloric orifice of the stomach occurs the first of four symmetrical, equidistant circu-



SPECIMEN OF FOUR HEALED, ASCENDING, ILEAL INTUSSUSCEPTIONS, SYMMETRICAL AND EQUIDISTANT.—A, needle passed through pocket in floor of upper intussusception; B, ascending intussusception; C, ligature around lower end; D, ascending intussusception; E, ligature near upper end; F, ascending intussusception.

lar constrictions in the small intestine. The distance between each is exactly thirty-three centimetres. The first, second, and third nodules, from above downward, measure four centimetres in length, the fourth and lowest is five and a half centimetres long. The serous surface of each one of these constrictions is rough and shreddy, on account of chronic changes in the peritoneum, which elsewhere presents only the acute changes above referred to. Along the convex border of each nodular constriction the wall of the intestine is stretched, but at the mesenteric border there are many folds and wrinkles and cicatricial thickening in the corresponding part of the mesentery. The



upper margin of each mass shows its serous coat to be directly continuous with the general intestinal serosa, but the lower margin in each instance presents a distinct interruption in the continuity of the external covering, because at these points the intestine appears to pass upward into the lumen of the portion above after the manner of the typical intussusception, the fold formed by the junction of the returning layer with the sheath being distinctly visible in each instance as well as the entering portion, the cicatricial changes not having succeeded in obliterating the distinction between the various layers at the neck which, in this case, was the lower end of the various invaginations. In some places bands of fibrous tissue would pass from the outside layer to the entering portion. It was readily ascertained that the various layers of what were now thought to be old intussusceptions were so firmly adherent to each other as to render the invagination irreducible in each instance. At the constrictions palpation indicates great thickness and firmness in the intestinal wall. Commencing immediately below the pylorus and extending to the lowest nodular constriction, the small intestine presents a quite uniform dilatation of the parts above as well as between the equidistant circular areas of narrowing, measuring on an average five centimetres in diameter, the wall thickness also being perceptibly increased. Immediately below the last annular groove the bowel assumes its usual size. Water runs through quite readily, but slowest through the inferior constriction.

Examination of the cut and the internal surface of each one of the constrictions showed, in the first place, great increase in the wall thickness as compared with the normal intestinal wall,—the wall of the upper constriction measuring seven millimetres, that of the lower one centimetre. On opening the intestine along the mesenteric border of each nodule, after having first sent a stream of water through with considerable force, there was found to be quite an accumulation of undigested food above each constriction, the diameter of the lumen varying from three to eight millimetres, the canal being often tortuous.

The uppermost constriction showed on the mucous surface an irregular annular ulceration, in the floor of which were small cavities, sometimes intercommunicating, in places lined with a mucous membrane. At the neck of the intussusceptum the firmest sort of union existed. It was evident that the intussusceptum had undergone only a partial necrosis, and the pockets with the mucous lining were formed by irregular ulceration in the entering and returning layers. The lining of these pockets was shown to be intestinal mucosa by means of microscopic examination; there was an intense round-cell infiltration present.

The second area showed a distinct circular ulcer, with a smooth, hard floor and margins; here were two pockets near the upper limit,—i.e., the apex,—lined with mucous membrane. These pockets were taken to mean that while the intussusceptum had largely disappeared, yet the very apex remained and union between the two opposed mucous surfaces had failed to occur; otherwise the union was very firm.



The third constriction showed a circular, granulating ulcer, corresponding in outline to the external annular groove; the floor was smooth and the margins rounded; at the upper limit were a few shallow pockets, whose origins were thought to be the same as those just mentioned above.

The lowermost zone of narrowing showed the layers of the intussusception quite distinctly; the mucous surface was an annular area, smooth and even, without any sign of recent ulceration, and the union between the various layers was firm and solid; at the apex was a pocket one centimetre deep; the *valvulae conniventes* were lost over the intussusception and for a short distance above it.

As a general statement, applicable to all these constrictions, it may be said that at the neck or lower border the three layers of the intussusceptions can always be traced readily, because the union between the entering and returning layers always commences a little above the fold formed by the junction of the returning and the receiving layer. In the lowest invagination the various layers are quite distinctly traceable throughout, as here only superficial ulceration of the internal mucous surface of the intussusceptum has taken place, the apposed surfaces uniting.

From this description it has become evident that the at first puzzling formations are four symmetrical, equidistant, ascending, irreducible or healed, ileal invaginations.

Aside from the general interest which this queer specimen awakens on account of its very rarity and uniqueness, the particularly attractive feature is the question as to possible causes of the multiple intussusceptions, all of which are ascending.

The changes presented in the intestine all point to the existence of the invaginations for a very considerable time before death, just how long cannot even be approximately determined; the fact that these changes, reparative as well as destructive, are apparently equally far advanced in the various invaginations warrants the inference that they occurred quite simultaneously; this supposition is greatly strengthened by the uniform dilatation and hypertrophy of the intestine above and between the invaginations. An accurate and detailed circumstantial clinical history might perhaps have thrown some further light upon these points.

The similarity of these persistent invaginations to the agonal is quite marked; like the agonal, they are multiple, rather short, they are in the ileum, and they are ascending, which is not at all an uncommon feature of the invaginations of death. Agonal invaginations in the adult are, however, uncommon and seldom found; but, in spite of this fact, the suggestion is near at hand that perhaps the multiple, healed invaginations here described are, as it were, persistent agonal formations, the death-struggle implied terminating in favor of the patient. During the twenty years that he suffered with double inguinal hernia, as well as during the two operations mentioned, the patient may, of course, have been at the point of death more than once, and at such a time the invaginations may have occurred



and then prompt inflammatory adhesions of the parts invaginated ensued.

Though the supposition that these invaginations are persistent agonal ones may seem far-fetched, yet the clinical history, imperfect and fragmentary as it is, certainly points to probable attacks of arrested or disturbed peristaltic action, during which the retrograde intussusceptions might be produced.

In a patient with double inguinal hernia of twenty years' standing, with the history of two operations for radical cure, there are certainly embodied great probabilities for the creation of those conditions under which, according to Leichtenstern,<sup>1</sup> ascending inflammatory invaginations occur, such as arrest of the onward movement of the intestinal contents, spasmodic, reversed, and interrupted peristalsis, conditions quite similar to what is thought to occur during the death-struggle, when agonal invaginations may form.

Consequently, it seems most reasonable to regard the ascending, inflammatory invaginations in this specimen as kindred to the agonal in their genesis, although it is by no means clear, under the generally accepted theories as to the mode of production of the ordinary intussusception, why such special and peculiar circumstances should always be necessary in order to develop ascending invaginations, especially as long as such instances are recorded by reliable observers without any special complications of any kind whatsoever.

*Conclusion.*—In what has been written there is described a specimen of four healed, ascending, ileal invaginations.

It is not possible to determine positively whether they are primarily inflammatory or persistent agonal intussusceptions; the clinical history furnishes many incidents that point to a genesis similar to that of the invaginations of the dying, as there may have been periods of impending extinction of life as well as of arrested or of riotous peristalsis without any immediately threatening symptoms.

This specimen is extraordinarily and absolutely unique for the following reasons :

1. The number of the invaginations,—four.
2. Because all the invaginations are ascending.
3. Because all the intussusceptions have healed by sequestration of the intussusceptum and by firm union between the intestinal ends, all reparative and compensatory changes being so uniformly advanced as to lead to the conclusion that the invaginations are of simultaneous origin.
4. Finally, it is worthy of note that the invaginations are symmetrical and equidistant.

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<sup>1</sup> Loc. cit.













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